and advice in efforts to lessen the frightful destruction of wild life everywhere prevalent, the book will be an encouragement and an assistance.

R. H.

The Tree Frog. — A second interesting contribution to the natural history of European Amphibia by one who loves his subject is to be found in the *Quarterly of the Natural History Society of Zurich*, issued Feb. 15, 1899. H. Fischer-Sigwart, having previously described the life of *Rana fusca*,[1] now tells us of the habits of the tree frog, *Hyla arborea* L. The spawning, larval life, feeding, hibernation, etc., were studied both in the open and in his terrarium, where he kept many of these creatures (some for ten years), with greater satisfaction to himself than to his neighbors, who complained of the noise made by the ardent males. A tabulation of many observations upon the singing of these frogs and the state of the weather does not support the common belief in their powers as weather prophets, though showing that cold, stormy weather checks, as fine, warm weather increases, their musical efforts.

A long series of observations upon their color led to the result that they resembled the background in every case except one, slowly assuming various combinations of yellow, green, brown, gray, bronze, rust-red in harmony with the leaves, earth, cement, iron pipe, etc., they remained upon.

For details we must refer to the twenty-seven pages of the original.

E. A. A.

The Protoplasm of the Salmon Egg.[2] — Professor His has added another study to his previous noteworthy work upon the egg of the salmon. As before, he emphasizes the study of live material, while the interesting photographs that accompany his paper show, as far as photographs can, the appearance of preserved and sectioned material.

The protoplasm that collects in a heap (subsequently to divide into the cells of the blastoderm) acts, when removed from the egg, like a viscid liquid. It is made up of a clear "Hyaloplasma" and a turbid, granular "Morphoplasma." As development proceeds, these two parts undergo progressive changes in relative amount and arrangement. The changes in the distribution of these two parts

[1] See review in the *American Naturalist*, June, 1898.

[2] Protoplasmastudien am Salmodien Keim. *Abh. Königl. Sach. Gesell. Wiss.*, Bd. xxv, 1899.

of the protoplasm and the lack of any fixed permanent structure make one of the main theses of the author's work. His conception of the organization of protoplasm as derived from preserved material and from fresh material is that the Morphoplasm forms a framework enclosing Hyaloplasma in its meshes. In young cells the framework is uniform and fine meshed; later various modifications arise, so that the end result is very different in different cells and organisms. This morphoplasmic framework is continuous with the nucleus, and with the cell wall which is an actual membrane or modification of the framework and connected by radiating strands with the rest of the framework. The Hyaloplasma is a translucent, viscid liquid not visibly acted upon by reagents that act on proteid matter; it is thought to be inert, not living. Where large areas of clear Protoplasma, ectosarc, are seen to be contractile, it is really the Morphoplasma of the limiting membrane and of the few strands that pass through the liquid that is the real agent. When granules are seen moving through the Hyaloplasma they are supposed to be really in unseen strands of Morphoplasma.

The Morphoplasma is full of granules, microsomes, or plasmosomes. These may stand at irregular intervals, and hence there must be some substance to hold them together, *i.e.*, the strand is not merely a row of granules but consists of granules imbedded in a connecting substance supposed to be a viscid liquid not mixing with the Hyaloplasma. Though it is difficult to distinguish microsomes from yolk granules, secretions, etc., yet the author thinks there are real plasmosomes as essential elements of the strands of Morphoplasma. Though thus agreeing with Bütschli, that protoplasm has two non-miscible liquids as basis of its organization, the author does not accept the alveolar theory of structure as accounting for the morphoplasmic framework which is often seen as actual fibrils and not membranes.

As development proceeds, the undifferentiated protoplasm becomes differentiated, the meshes enlarge, the strands thicken and become fewer, and all the various specializations of cell division appear. Of the many interesting details of the latter phenomena here recorded, we will mention only the new interpretation of the well-known ring, or vesicle-like, appearances of the chromosomes as they are coming together in the formation of daughter-nuclei. The author thinks the Morphoplasma is prearranged in meshes of different size in different parts of the cell traversed by the chromosomes in moving from the equator of the spindle to the polar regions, and that when

they pass through the narrow meshed regions they assume a corresponding slender form, to expand later in the wider rings in the region of wider meshwork. The chromosomes are collections of chromatic granules which are arranged on the walls of the meshes, hence they outline a figure corresponding to the shape and size of the mesh. All this, the author concedes, would lend itself to the idea that we are dealing with an alveolar or vesicular structure.

The formation of new cell walls by the thickening and fusing of strands of the framework is apparently similar to the mode of making cell walls in the cleavage of echinoderm eggs as described by G. F. Andrews.[1] And the conception of chromatin granules moving along strands of protoplasm, as do granules in the pseudopodia of rhizopods, is also the same as the flowing or filose movements there described for the interalveolar plasma in various animal tissues and eggs. Considerable space is given to the description of remarkable amœboid movements performed by the cells of the blastoderm; they may send out very long finger-like pseudopodia which are at first chiefly clear Hyaloplasma but may become granular and be withdrawn. These activities, however, are not known in the normal state, but seem to be called forth by the stimuli that come to the blastoderm when removed to a compressorium for observation. Among other interesting observations we will mention only the occurrence of multiple asters in eggs that had not been fertilized, a phenomenon similar to that observed by T. H. Morgan[2] in echinoderm eggs. The unfertilized eggs of the salmon may be kept in running water for weeks without losing life. In the rainbow trout, also, unfertilized eggs were not dead at the end of several weeks.

Sections of such eggs kept seventeen days show numerous asters in which the radiating lines connect with a rather uniform mesh of the morphoplasm or else with the rays of other asters. At the center of each aster is a group of granules, representing the centrosome.

E. A. A.

Embryology of Invertebrates.[3] — The first part of the original German edition of Korschelt and Heider's Embryology of the Invertebrates appeared in 1890, and the last part in 1893. The translation

[1] The Living Substance. *Journ. of Morphol.*, Supplement 1897.

[2] The Action of Salt Solutions, etc. *Roux's Archiv*, Bd. viii, 1897.

[3] Korschelt, Dr E., and Heider, Dr. K. Text-book of the Embryology of Invertebrates. Vol. i translated by E. L. Mark and W. M. Woodworth; vols. ii and iii translated by M. Bernard and revised and edited by M. F. Woodward. The Macmillan Company.